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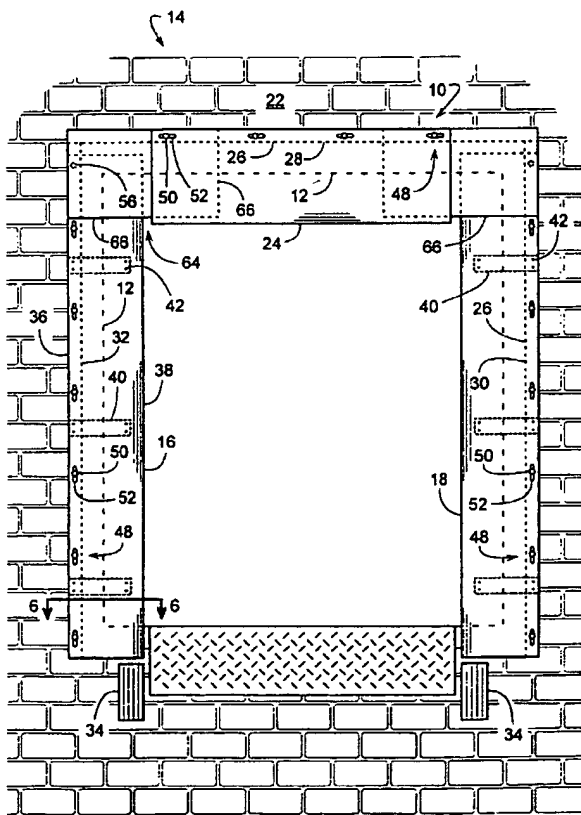
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(54) Title: **LOADING DOCK SHELTER WITH SEMI-RIGID CURTAINS**



(57) **Abstract:** In order to provide a loading dock shelter (10) with an effective seal, the shelter is provided with a side curtain (16, 18) that is semi-rigid. The relative stiffness of the curtain allows it to be supported along a vertical edge, while a distal vertical edge of the curtain can be cantilevered for sealing against the side of a truck (20). The curtain has sufficient flexibility and resilience to at least partially seal against the truck (20) without having to rely on compressible foam. In some cases, the semi-rigid curtain is attached to a side frame (26) by way of a sliding connection that allows for differences in thermal expansion between the curtain and the frame. A relatively pliable corner seal helps seal a gap between the side curtain (16, 18) and an adjacent head curtain (24).

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LOADING DOCK SHELTER WITH SEMI-RIGID CURTAINS

25

Background of the Invention

Field of the Invention

30 The subject invention generally pertains to loading dock shelters and more specifically to an enhanced sealing member for such a shelter.

Description of Related Art

35 Trucks and other vehicles typically back up against a loading dock or doorway of a building to facilitate loading and unloading of the vehicle's cargo. Often a dock shelter is installed around the doorway to help shelter the area between the perimeter of the doorway and the rear of the vehicle. If left unsheltered, air gaps between the outer wall of the building and the back of the vehicle might allow the outside weather to increase the building's heating or cooling load, allow rain and snow to enter the interior of the building, or simply subject the inside dock workers to an uncomfortable draft while they
40 service the vehicle.

Dock shelters usually include a framework that extends one to three feet outward from the face of the building wall. In some cases, pliable curtains hang from the framework and are situated to drape over the top and either side of a vehicle parked under the shelter. Such curtains are generally not self-supporting and tend to be rather limp,
45 which can create a poor appearance. Lateral reinforcement of such curtains may be provided by including stays or other stiffeners. While this may improve appearance and/or sealing characteristics, it also requires additional components and labor to assemble. Further, while shelters may be adequate in milder climates, additional or alternate sealing may be required where weather conditions are more severe.

50 Thus, some loading docks are provided with dock seals made of a resiliently compressible foam pad. As a truck backs into the dock and against the seal, the foam pad

compresses to conform to the contour of the rear edges of the truck. Although effective, such seals can be expensive, as they comprise an assembly of components. The foam pad usually needs a tough outer cover to protect the pad from wear and to prevent the pad
55 from absorbing water and dirt. A cover should be tough to resist wear, yet pliable to allow the foam pad to compress. Unfortunately, some of the toughest materials are not very pliable, and vice versa. So, a compromise is often needed in selecting a cover with an optimum combination of toughness and pliability.

Consequently, a need exists for a dock shelter that provides a more positive seal
60 than current shelters, yet is more economical than conventional dock seals.

Summary of the Invention

65 In order to provide a dock shelter with a more effective seal, a dock shelter is provided with a side curtain that is semi-rigid. The relative stiffness of the curtain allows it to be supported along a vertical edge, while a distal vertical edge of the curtain can be cantilevered for sealing against the side of a truck. The curtain has sufficient flexibility and resilience to at least partially seal against the side of a truck without having to rely on
70 compressible foam. In some cases, the semi-rigid curtain is attached to a side frame by way of a sliding connection that allows for differences in thermal expansion between the curtain and the frame.

In some embodiments, a dock shelter is provided with a head curtain attached to a head frame by way of a sliding connection that allows for differences in thermal
75 expansion between the head frame and the head curtain.

In some embodiments, a corner curtain covers the gap between a side curtain and a head curtain with the corner curtain being more pliable than the side curtain or the head curtain.

In some embodiments, a sliding connection between a side curtain and a side
80 frame is created by providing the curtain with vertical slots used for anchoring the curtain
to the frame.

In some embodiments, the dock shelter includes a vertically elongated side curtain
of sufficient rigidity to be cantilevered from an anchored vertical edge out to a distal
vertical edge.

85 In some embodiments, the distal vertical edge of a side curtain is curved about a
vertical axis to help prevent the edge from catching on a vehicle as the vehicle leaves the
dock shelter.

In some embodiments, metal stays provide a plastic side curtain with greater
rigidity and resilience.

Brief Description of the Drawings

Figure 1 is a front view of one embodiment of a dock shelter with a semi-rigid
95 side curtain.

Figure 2 is a side view of the dock shelter of Figure 1 showing a vehicle backing
into the shelter.

Figure 3 is the same as Figure 2, but showing the vehicle having already backed
into the shelter.

100 Figure 4 is a cross-sectional view taken along line 4-4 of Figure 3.

Figure 5 is a cross-sectional view taken along line 5-5 of Figure 3.

Figure 6 is a cross-sectional view taken along line 6-6 of Figure 1.

Figure 7 is a cross-sectional view taken along line 7-7 of Figure 6.

Figure 8 is a cross-sectional view similar to Figure 6, but of another embodiment.

105 Figure 9 is a cross-sectional view similar to Figure 6, but of another embodiment.

Description of the Preferred Embodiment

110 Referring to Figures 1 – 3, a dock shelter 10 installed around a doorway 12 of a loading dock 14 includes semi-rigid side curtains 16 and 18 that help provide a weather seal between the rear sides of a vehicle 20 and a wall 22 of a building. To help seal along a rear upper surface of vehicle 20, a head curtain 24 (similar to side curtains 16 and 18 or of another design) can be installed along an upper portion of dock shelter 10.

115 To support the curtains, shelter 10 includes a frame 26 comprising a head frame 28, a right side frame 30 and a left side frame 32 that respectively support curtains 16, 18 and 24. Frame 26 attaches to wall 22 and supports the curtains in an offset relationship to the face of wall 22. The offset relationship allows vehicle 20 to back into shelter 10 and underneath head frame 28. As vehicle 20 backs into shelter 10 and against bumpers 30
120 (i.e., moves from the position of Figures 2 and 4 to that of Figures 3 and 5), the sides and top of vehicle 20, being larger than the inner dimensions of shelter 10, deflect the inner edges of curtains 16, 18 and 24 backward and inward. The inner edges of the curtains thus provide a sliding seal against the rear sides and roof of vehicle 20.

To create the sliding seal, curtains 16, 18 and 24 can be moved from their standby
125 positions of Figures 1, 2 and 4 to their operative sealing positions of Figures 3 and 5, as vehicle 20 backs into shelter 10. Although such curtain movement can be provided by using hinges to attach the curtains to frame 26, a preferred approach is to make curtains 16, 18 and 24 of a material having sufficient flexibility to resiliently bend without the use of hinges. However, the curtain material preferably still has sufficient rigidity to allow
130 left side curtain 16 to be cantilevered from a proximal edge 36 (attached to side frame 32) to a distal edge 38 (adapted to slidingly engage vehicle 20). The same applies to right side curtain 18. Head curtain 24, as mentioned earlier, can be of a similar construction or of another design entirely. For the sake of simplicity, dock shelter 10 will be described primarily with reference to left side curtain 16, with right side curtain 18 and head curtain
135 24 having similar features.

In some embodiments, side curtain 16 is made of 1/8-inch thick high molecular weight polyethylene. Although other materials and thickness can be used, this material in particular provides several benefits. The relatively high density and other properties of high molecular weight polyethylene makes it more resistant to water, dirt and abrasion than many foam materials, and thus the material does not require a protective cover. The rigidity of polyethylene not only provides a neat, sag-free appearance, but also allows side curtain 16 to be cantilevered from proximal edge 36, rather than being suspended from its top edge. Supporting curtain 16 from the side allows distal edge 38 more freedom of movement, especially near the top of curtain 16, thus distal edge 38 can effectively seal against vehicle 20 over a broader range of curtain deflection.

A curtain made of polyethylene alone may have sufficient resilience to return from its operative position to its standby position, especially if gravity urges the curtain to its standby position, as is the case with head curtain 24. Nonetheless, side curtain 16 may include several spring-steel stays 40 that improve the curtain's overall resilience. Stays 40 can be attached to side curtain 16 by any one of a variety of fasteners 42 including, but not limited to, screws or rivets. Fasteners 42 are preferably attached at opposite ends of each stay 40 to allow a central portion of stay 40 to bend away from the plastic portion of curtain 16 as curtain 16 deflects about a vertical axis 44 (Figure 5).

To smoothen the movement of side curtain 16 as a departing vehicle allows curtain 16 to return to its standby position, distal edge 38 is curved about a vertical axis 46, as shown in Figure 4. With distal edge 38 being curved rather than sharp and straight, distal edge 38 is less likely to catch on the side of vehicle 20 as vehicle 20 moves out from within dock shelter 10.

In some cases, side frame 32 and side curtain 16 have different coefficients of thermal expansion. For instance, curtain 16 being made of polyethylene has a greater coefficient of thermal expansion than a side frame being made of wood. To accommodate this difference, a sliding connection 48 can be used to attach side curtain 16 to side frame 32, as shown in Figures 1, 6 and 7. For example, sliding connection 48 can be provided by screws 50 protruding through elongated slots 52 in curtain 16 and

165 screwing into side frame 32. The shank of screws 50 form vertically fixed posts which
extend into the elongated slots 52. One will appreciate that other vertically fixed posts
could achieve the same function - such as posts formed in the side frame or otherwise
affixed thereto. In the case of screws 50, they serve the additional advantageous function
of limiting movement of the curtain away from the wall due to the presence of the screw
170 heads. A stand-off bushing 54 can be added to help prevent the head of screw 50 from
being over tightened against curtain 16. If bushing 54 is used, the shank of screw 50 fits
through bushing 54, and the bushing is a part of the vertically fixed post as a sliding fit is
provided between an outer diameter of bushing 54 and the width of slot 52. For the
illustrated dock shelter, side curtain 16 includes one point of attachment 56 that is
175 relatively fixed, rather than being a sliding connection. The fixed point ensures that any
expansion of side curtain 16 will be from that point. In other words, with point 56 being
near the top of side curtain 16, the bottom of curtain 16 will move more than the top, as
curtain 16 expands and contracts vertically. Alternatively, the curtain adjacent point 56
could have a slot as well, but having a smaller vertical extent than the other slots and
180 positioned such that the screw or vertically fixed post would normally be disposed at the
top of that slot.

Figure 8 illustrates another example of a sliding connection 48'. Here, a sliding
fit exists between slot 52 and screw 50; however, an angle member 58 attached to a side
frame 32' prevents the head of screw 50 from being tightened against curtain 16. Thus,
185 bushing 54 can be eliminated.

In another example of a sliding connection 48'', shown in Figure 9, a side curtain
16' includes a ridge 60 running along a proximal edge 36' of curtain 16'. An angle
member 62 with an added lip 64 then captures ridge 60 to limit the curtain's sideways
movement (i.e., perpendicular to the length of proximal edge 36'). Thus, ridge 60 and
190 angle member 62 inhibit curtain 16' from completely separating from a side frame 32''
and member 62. However, angle member 62 provides ridge 60 with enough clearance to
allow some sliding movement between curtain 16' and frame 32'' for thermal expansion
in a direction parallel to ridge 60. Ridge 60 can be an integral extension of curtain 16' or

can be an added piece attached using an adhesive or a mechanical fastener. A mechanical
195 stop, such as a fastener or some other obstruction, may be added to limit how far ridge 60
can slide within angle member 62.

To help cover a gap 64 between side curtain 16 and head curtain 24, a corner
curtain 66 can be installed at each upper corner of dock shelter 10. Corner curtain 66 can
be especially useful, as gap 64 increases in size as the other curtains deflect from their
200 standby positions to their operative positions. As gap 64 widens, its shape changes
significantly with its defining edges being distorted three-dimensionally. To maintain gap
64 covered under such distortion, corner seal 66 overlaps both head curtain 24 and side
curtain 16. Also, corner curtain 66 is preferably more pliable than curtains 16 and 24 to
effectively conform to the changing shape of gap 64. In some embodiments, corner
205 curtain 66 is a relatively lightweight vinyl attached to frame 26, such that corner curtain
66 is in front of side curtain 16 and behind head curtain 24, or conversely, in front of head
curtain 24 and behind side curtain 16.

Although the invention is described with reference to a presently preferred
embodiment, it should be appreciated by those skilled in the art that various modifications
210 are well within the scope of the invention. Therefore, the scope of the invention is to be
determined by reference to the claims that follow.

I claim:

Claims

215

1. A dock shelter adapted to provide at least a partial seal between a vehicle and a wall of a building, comprising:

a side frame mountable to the wall and being vertically elongated;

220

a side curtain having a proximal edge coupled to the side frame and a distal edge adapted to engage the vehicle; and

a sliding connection that couples the proximal edge to the frame, wherein the sliding connection allows vertical thermal expansion of the side curtain relative to the side frame.

225

2. The dock shelter of claim 1 wherein the sliding connection comprises at least one vertical slot in the side curtain and at least one vertically fixed post fixed relative to the side frame and received within the at least one slot.

230

3. The dock shelter of claim 2, further comprising a plurality of metal stays attached to the side curtain to help bias the side curtain to the standby position.

235

4. The dock shelter of claim 2, wherein the distal edge curves about a second vertical axis.

240

5. The dock shelter of claim 1, wherein the proximal edge has a plurality of vertically elongated slots that facilitate the sliding connection.

6. The dock shelter of claim 5, further comprising a plurality of fasteners extending through a plurality of bushings, which in turn extend through the plurality of elongated slots, wherein the plurality of bushings each have a length that helps prevent the plurality of fasteners from being over tightened against the side curtain.

7. The dock shelter of claim 1, further comprising: a head frame mountable to the wall and being horizontally elongated; a head curtain suspended from the head frame; and a corner curtain bridging a gap between the head curtain and the side curtain.

8. The dock shelter of claim 7, wherein the corner curtain is more flexible than the side curtain and the head curtain.

9. The dock shelter of claim 7, wherein the corner curtain includes a first portion that overlaps the side curtain and a second portion that overlaps the head curtain such that the side curtain is closer to the wall than the first portion but the second portion is closer to the wall than the head curtain.

10. A dock shelter adapted to provide at least a partial seal between a vehicle and a wall of a building, comprising:
a side frame mountable to the wall and being vertically elongated;
a side curtain having a proximal edge coupled to the side frame and a distal edge adapted to engage the vehicle; and
a first sliding connection that couples the proximal edge to the frame, wherein the first sliding connection allows vertical thermal expansion of the side curtain relative to the side frame;

a head frame mountable to the wall and being horizontally elongated;
a head curtain suspended from the head frame; and
a second sliding connection that couples the head curtain to the head frame,
275 wherein the second sliding connection allows horizontal thermal expansion of the head
curtain relative to the head frame.

11. The dock shelter of claim 10, wherein the distal edge curves about a vertical axis.
280

12. The dock shelter of claim 10, further comprising a corner curtain bridging a gap
between the head curtain and the side curtain.

13. The dock shelter of claim 12, wherein the corner curtain is more flexible than the
head curtain and the side curtain.
285

14. The dock shelter of claim 10, wherein the first sliding connection comprises at
290 least one vertical slot in the side curtain and at least one vertically fixed post fixed
relative to the side frame and received within the at least one slot.

15. A dock shelter adapted to provide at least a partial seal between a vehicle and a
295 wall of a building, comprising:

a side frame mountable to the wall and being vertically elongated;
a side curtain having a proximal edge coupled to the side frame and a distal edge
adapted to engage the vehicle;
a head frame mountable to the wall and being horizontally elongated;
300 a head curtain suspended from the head frame; and

a corner curtain bridging a gap between the head curtain and the side curtain,
wherein the corner curtain is more pliable than the side curtain.

- 305 16. The dock shelter of claim 15, wherein the corner curtain is more pliable than the
head curtain.

FIG. 1

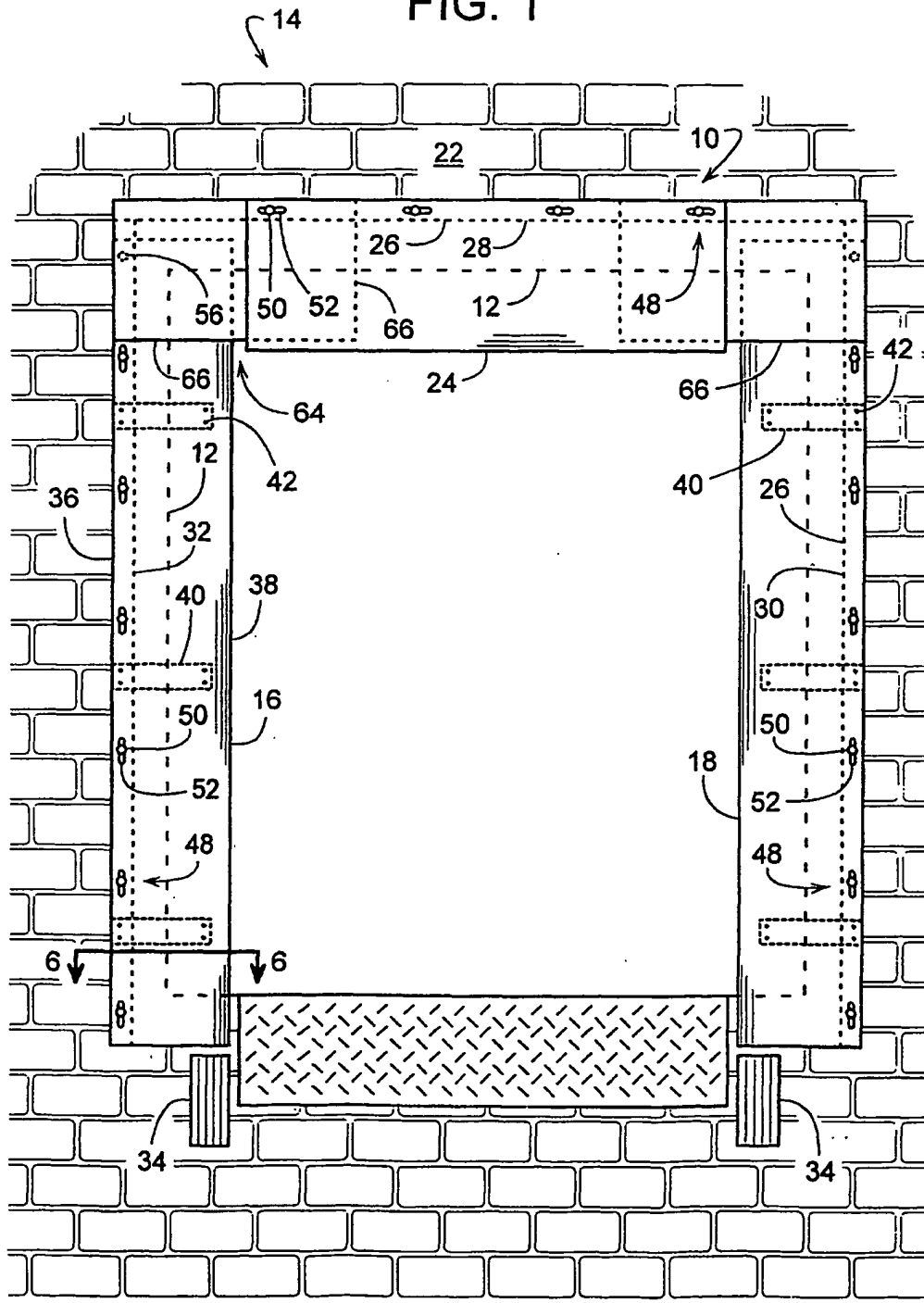


FIG. 2

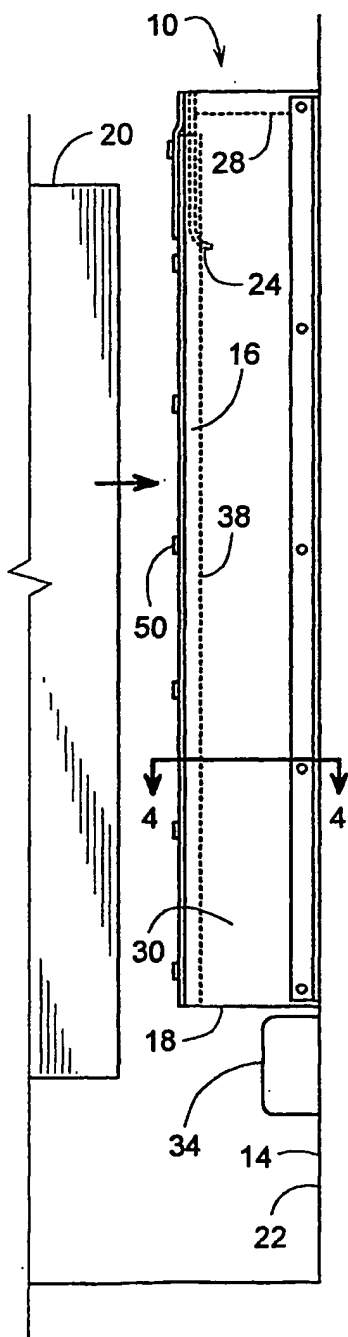


FIG. 3

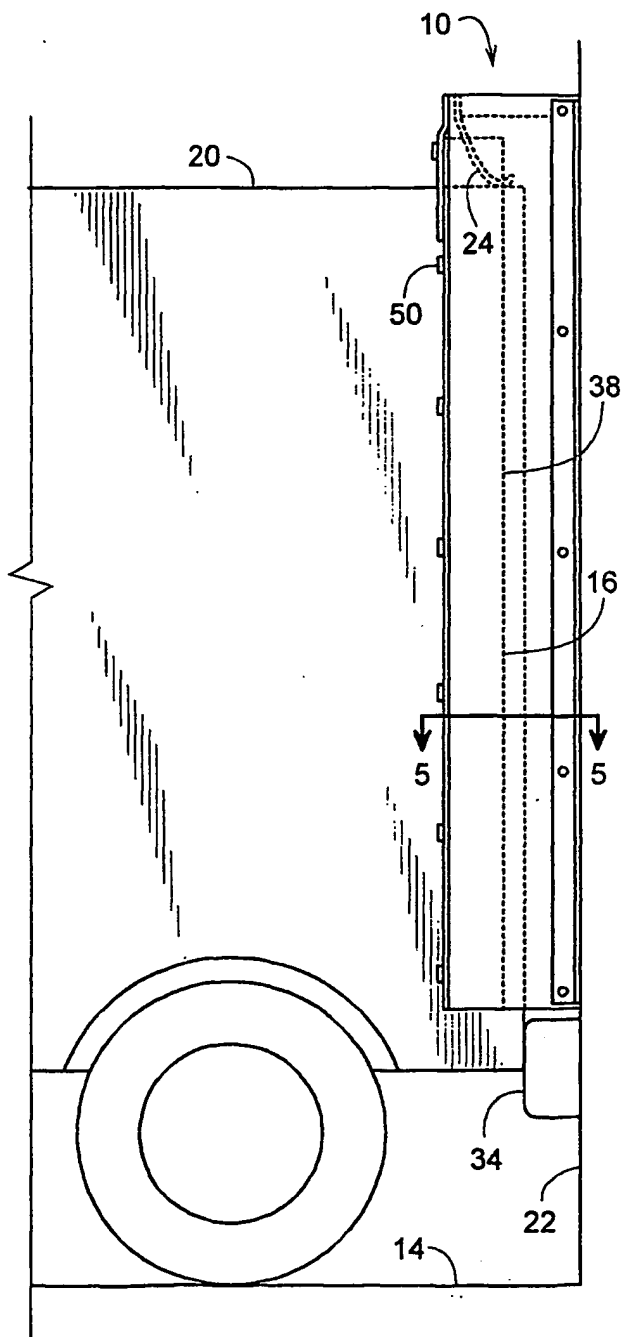


FIG. 4

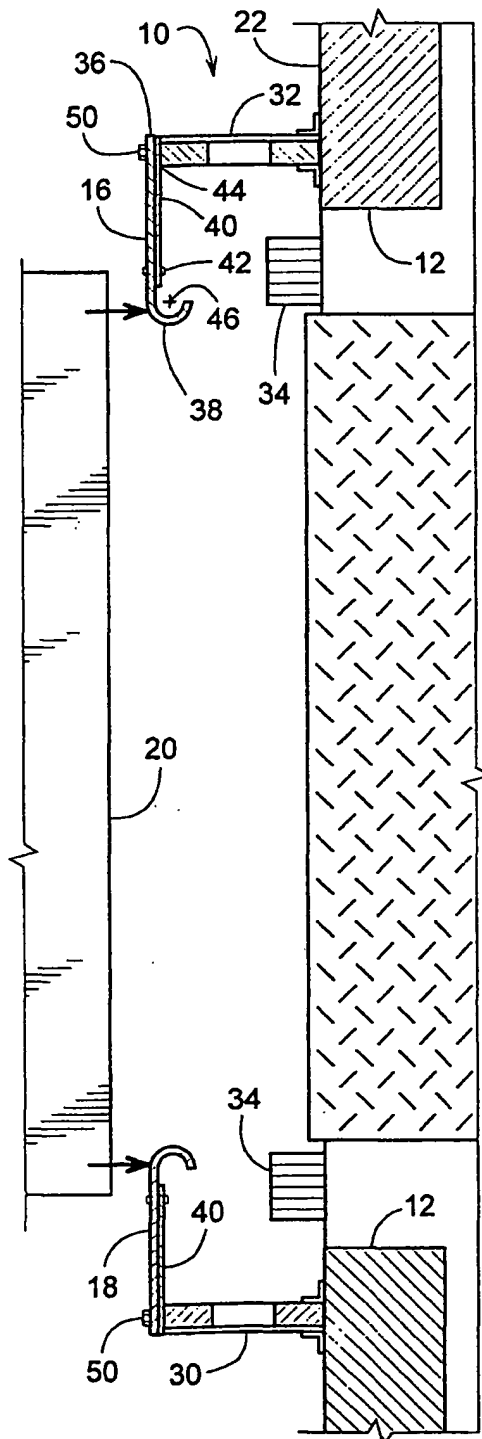


FIG. 5

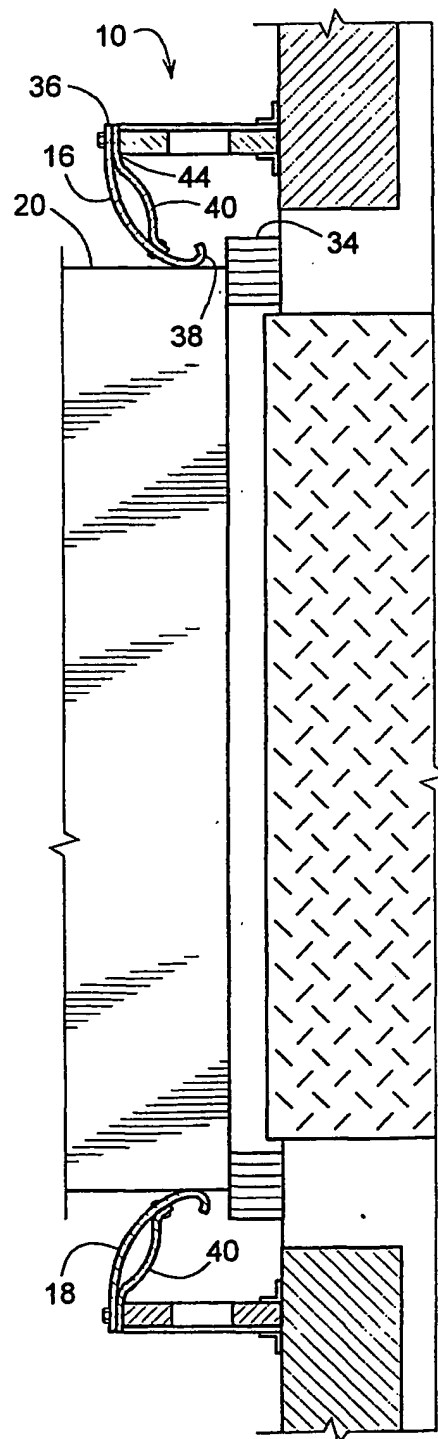


FIG. 7

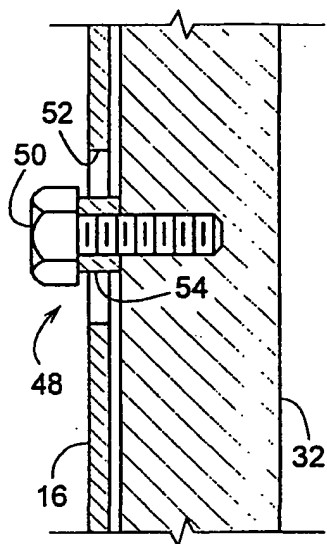


FIG. 6

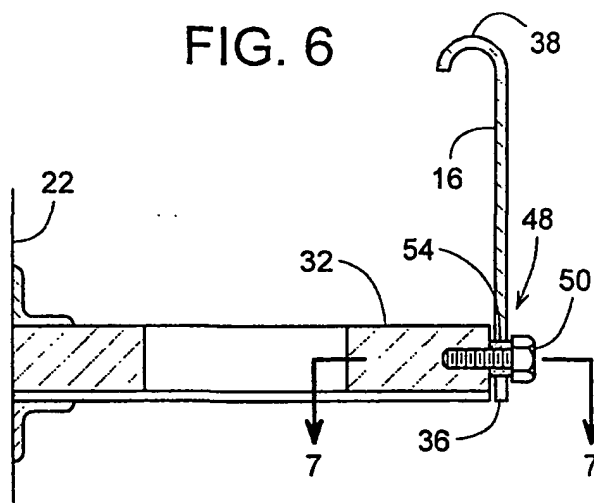


FIG. 8

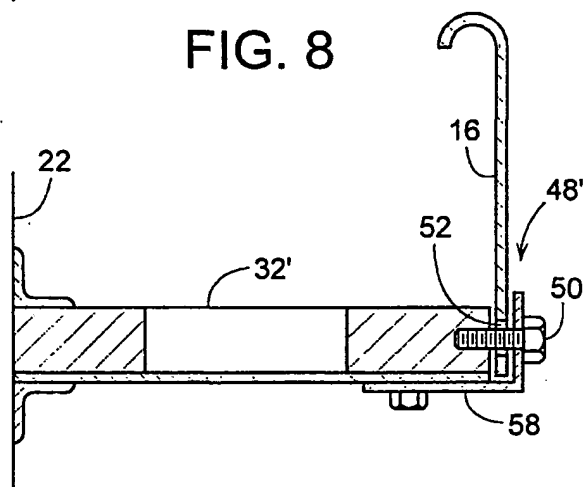
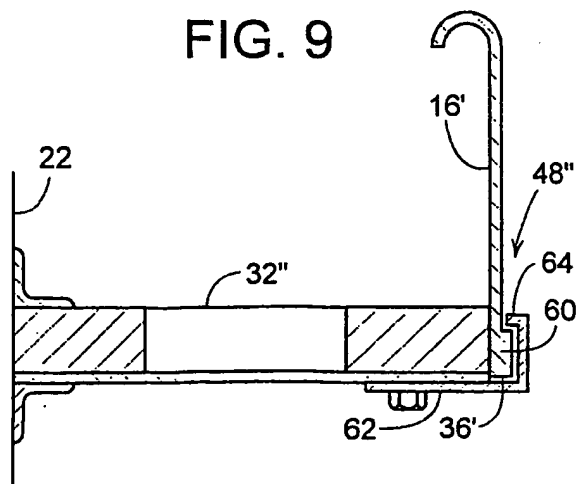


FIG. 9



INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : EO4D 15/18

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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 52/173.2, 518, 526, 527

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 3,557,508 A (FROMMELT et al.) 26 January 1971, columns 1-6.	1-6, 10, 11, 14
Y	US 5,037,685 A (RICHARDS et al.) 06 August 1991, columns 1-4.	1-6, 10, 11, 14
A	US 4,365,452 A (FILLMAN et al.) 28 December 1982, columns 1-3.	1-6, 10, 11, 14

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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